



QD-R-004
REVISION D
EFFECTIVE DATE: October 1, 2004

ORGANIZATIONAL INSTRUCTION

RELIABILITY PROGRAM PLAN

OPR(s)

QD10, QD20, QD30
and QD40

OPR DESIGNEE

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DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		11/20/97	
Revision	A	7/1/99	Changes made to reflect new organization code changes and/or Changes made to reflect new directives renumbering scheme and cancellation of handbooks NHB 5300.4 (1A-1) and (1D-2). In addition, changes were made to incorporate the corrective action requirements of NCR 266.
Revision	B	9/09/02	Format and numbering change to implement requirements of QS-A-001 rev F.
Revision	C	10/20/03	Changes made to reflect new organization code changes, cancellation of handbook NHB 5300.4 (1G), and update/correct 4.0 Instructions verbiage.
Revision	D	10/1/04	Updated OI to implement HQ Rules Review in accordance with CAITS Action # 04-DA-01-0387) (Utilizing the word "Shall" for all requirements, removing ambiguity, removing non-requirements, etc.)

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Reliability Program Plan

1. SCOPE

1.1 Purpose

The purpose of this OI is to describe the process that shall be used for development, evaluation and approval of a Reliability Program Plan (RPP). The development of a RPP early in the design and development phase of a program is paramount to achieving established Reliability requirements.

1.2 Scope

This OI describes the S&MA responsibility that shall be performed for flight hardware/software for reliability program plan. This Organizational Instruction (OI) provides procedures for the development, evaluation, and approval of a Reliability Program Plan [RPP].

1.3 Applicability

This OI shall be applicable to all S&MA personnel supporting MSFC projects that include Reliability requirements.

2. Applicable Documents

ANSI/ISO/ASQC A8402-1994	<i>Quality Management and Quality Assurance - Vocabulary</i>
NHB 5300.4 (1D2)	<i>Safety, Reliability, Maintainability & Quality provisions for the Space Shuttle Program</i>
NASA-STD-8729.1	<i>Planning, Developing and Managing an Effective Reliability and Maintainability Program</i>
OWI ED42-003	<i>Supportability and Logistics Engineering</i>

3. Definitions

All definitions applicable to this OI are addressed in the following document:

ANSI/ISO/ASQC A8402-1994	<i>Quality Management and Quality Assurance - Vocabulary</i>
NHB 5300.4 (1D2)	<i>Safety, Reliability, Maintainability & Quality provisions for the Space Shuttle Program</i>

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NASA-STD-8729.1

Planning, Developing and Managing an Effective Reliability and Maintainability Program

OWI ED42-003

Supportability and Logistics Engineering

4. Instructions

4.1 Reliability Program Plan Contents

The RPP shall describe how the Reliability tasks shall be performed, and *how* the Reliability requirements shall be met, and not merely state that the various required tasks will be performed.

Representative Key Elements of Reliability Program Plan are

- Reliability Organization Chart

- Reliability Plan to include

- I. Design for Reliability (DFR) processes including Reliability Design Criteria
- II. Reliability Trade Studies and Sensitivity Analysis
- III. Failure Modes and Effects Analysis and Critical Items List of the hardware including higher level analysis during conceptual design analysis effort
- IV. Reliability-Maintenance Interface through Reliability Centered Maintenance Analysis (RCMA) or other appropriate process.
- V. Design Reviews and Readiness Reviews
- VI. Problem Reporting and Corrective Action & Trending
- VII. ALERTS
- VIII. EEE Parts Control
- IX. Process Controls for critical processes of flight hardware.
- X. Limited Life Items List
- XI. Reliability Road-map including Reliability Growth Plan and Reliability Testing including Highly Accelerated Life Testing (HALT) where applicable or other Accelerated Life testing of hardware.
- XII. Flight hardware Acceptance and Qualification requirements along with supporting rationale/ philosophy and necessary documentation.
- XIII. Probabilistic Risk Assessment and/or other quantitative risk assessment (For example: Assessing Mean Time Between Failures (MTBF)) at system and component level etc) along with ground rules and assumptions.
- XIV. Role in Integrated Reliability, Maintainability and Supportability. At MSFC, S&MA provides leadership for R&M analysis and Engineering provides leadership for Supportability analysis process as part of the System Design effort.
- XV. Software Reliability Growth Model and Plan
- XVI. Human Reliability/error and its implication during design, analysis and processing of the hardware.
- XVII. Reliability Skill level definition and Training Plan
- XVIII. Plan for application of Reliability Engineering to HW/SW design and critical processes to minimize life cycle cost.

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The Reliability Program Plan (RPP) shall also identify and include the following:

- a) All Reliability requirements and any other requirements that relate to Reliability, such as Availability.
- b) Documents which are applicable to the requirements and performance of tasks covered by the Plan.
- c) Definitions of Reliability terms used in the RPP.
- d) Identification of all hardware and software covered by the Reliability program.
- e) Details of reliability analysis software used along with justification, if not using commercial-off-the shelf (COTS) R&M software.
- f) Details of the S&MA Reliability Organization and how it interfaces with the Engineering, Operations and Program Organizations.
- g) A matrix or table, which shows the relationship of the RPP tasks to the contract requirements.
- h) Details of phasing-in of the reliability activities with the major Program milestones in order to facilitate optimization of the life cycle cost.
- i) A Reliability task schedule, including completion dates.
- j) Responsibilities of Reliability managers and personnel and their relationships to the required tasks, as well as their interfaces with other organizations, which have inputs to the Reliability tasks.
- k) Detailed discussion of how each required task shall be performed along with ground rules, assumptions and applicable documents and how Reliability requirements are planned to be met.
- l) Identify all required data submittals along with submittal dates; provide a matrix or table showing the relationship of the data submittals to the Reliability tasks.
- m) Complete description of all in-house procedures, systems, and forms which shall be used.

4.2 Reliability Program Plan Evaluation

S&MA and the Program shall independently review the RPP for compliance with the instructions identified in this OI, and for compliance with the contract requirements.

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4.3 Reliability Program Plan Approval

The RPP shall be approved in accordance with Project requirements, after all review discrepancies have been corrected. This RPP shall be included in the Project Plan, S&MA Plan, or be a standalone document

5. Notes

5.1 Directive Replacement

This Directive replaces S&MA-CR10-R-Y-004, Reliability Program Plan.

5.2 Records:

Records	Repository	Period of Time
Reliability Program Plan	Hard copy maintained by the applicable Program/Project Office	Retain until end of program plus 3 years.

6. Safety Precautions and Warning Notes

N/A

7. Appendices, Data, Reports, and Forms

None

8. Records

None

9. Tools, Equipment, And Materials

None

10. Personnel Training And Certification

Training shall include reliability engineering and program management concepts and principles.